BREAKING THE CYCLE: SUBSTANCE ABUSE TREATMENT AND RECIDIVISM IN CALIFORNIA

Tatyana Yakshina
B.A., California State University, Sacramento, 2006

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BREAKING THE CYCLE: SUBSTANCE ABUSE TREATMENT AND RECIDIVISM IN CALIFORNIA

A Thesis

by

Tatyana Yakshina

Approved by:

____________________________, Committee Chair
Terri Sexton, Ph.D.

____________________________, Second Reader
Jonathan Kaplan, Ph.D.

____________________________
Date
Student: Tatyana Yakshina

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__________________________, Graduate Coordinator

Jonathan Kaplan, Ph.D.

Date

Department of Economics
Abstract

of

BREAKING THE CYCLE: SUBSTANCE ABUSE TREATMENT AND RECIDIVISM IN CALIFORNIA

by

Tatyana Yakshina

As substance abuse is common among repeat offenders, treatment is one effective strategy to stop the revolving door of corrections and represents the state’s best hope in combating recidivism due to substance abuse. Using probit regression, three treatment eligible groups and their subsequent recidivism rates are examined following one and two year observation periods for offenders who paroled in fiscal year 2005/2006. Relative to non-treated offenders, probability of recidivism is 18 percent lower among offenders who complete both in-prison and community aftercare treatment; probability of recidivism is 15 percent lower among offenders who complete in-prison treatment only. This analysis provides quantitative economic evidence that substance abuse treatment programs are effective in reducing recidivism in California.

_______________________
Terri Sexton, Ph.D., Committee Chair

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Date
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>List of Tables</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>vi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>List of Figures</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>vii</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>1</td>
</tr>
<tr>
<td>2. LITERATURE REVIEW</td>
<td>4</td>
</tr>
<tr>
<td>3. ESTIMATION METHODOLOGY AND STATISTICAL ANALYSIS</td>
<td>21</td>
</tr>
<tr>
<td>Offender Demographics</td>
<td>25</td>
</tr>
<tr>
<td>Offender Recidivism</td>
<td>27</td>
</tr>
<tr>
<td>Recidivism Breakdown by Gender</td>
<td>29</td>
</tr>
<tr>
<td>Recidivism Rates of Treated vs. Non-treated Offenders</td>
<td>33</td>
</tr>
<tr>
<td>4. RESULTS AND COST ANALYSIS</td>
<td>37</td>
</tr>
<tr>
<td>Cost-Effectiveness Analysis</td>
<td>42</td>
</tr>
<tr>
<td>5. CONCLUSION</td>
<td>46</td>
</tr>
<tr>
<td>Bibliography</td>
<td>49</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Table 1 Literature Review Research Studies Summary Data ........................................ 15
2. Table 2 Offender Descriptive Statistics ..................................................................... 27
3. Table 3 Regression Results ..................................................................................... 38
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Figure 1 One and Two Year Recidivism Rates for Offenders Paroled FY 2005/2006</td>
<td>28</td>
</tr>
<tr>
<td>2.</td>
<td>Figure 2 One and Two Year Recidivism Rates for Male Offenders Paroled FY 2005/2006</td>
<td>29</td>
</tr>
<tr>
<td>3.</td>
<td>Figure 3 One and Two Year Recidivism Rates for Female Offenders Paroled FY 2005/2006</td>
<td>31</td>
</tr>
<tr>
<td>4.</td>
<td>Figure 4 One and Two Year Recidivism Trend Analysis Offenders Paroled FY 2005/2006</td>
<td>32</td>
</tr>
<tr>
<td>5.</td>
<td>Figure 5 One and Two Year Recidivism Rates of Treated Offenders Paroled FY 2005/2006</td>
<td>33</td>
</tr>
<tr>
<td>6.</td>
<td>Figure 6 One and Two Year Recidivism Rates of Non-Treated Offenders Paroled FY 2005/2006</td>
<td>34</td>
</tr>
</tbody>
</table>
Chapter 1
INTRODUCTION

Purpose of the Study

Do substance abuse treatment programs reduce recidivism? Substance abuse is a major contributor to incarceration (French et al., 2010). According to the California Department of Corrections and Rehabilitation (CDCR), one in three inmates is in prison due to drug related incidences (CDCR annual report, 2009). Without treatment, parolees are significantly more likely to recidivate within one year of release (French et al.). In-prison and community aftercare treatment programs represent the state’s best hope in combating recidivism due to substance abuse. This research analyzes the effectiveness of California’s in-prison and community aftercare substance abuse treatment programs, in terms of their impact on subsequent recidivism.

The relationship between completion of both in-prison and community aftercare treatment, completion of in-prison treatment only, and no treatment exposure and subsequent recidivism rates following a one year and a two year observation period are examined to determine if substance abuse treatment is effective in reducing the number of offenders who return to prison. Individual level data such as an offender’s age, gender, race, commitment offense, and treatment status, from CDCR’s Offender Information Services Branch, are included in determining recidivism.

Treatment of substance abuse disorders among drug addicted inmates is a critical component of successful rehabilitation (French et al., 2010), and one effective strategy to
stop what is now known as the “revolving door of corrections” (McCollister et al., 2003).
Institutions invest thousands upon thousands of dollars into substance abuse treatment programs (Wexler et al., 1990; Hiller et al., 1999), but the effectiveness of such programs must clearly demonstrate economic as well as clinical benefits (French et al.). Few economic studies have been done to determine whether in-prison and community aftercare substance abuse treatment programs have generated both desirable outcomes and significant economic benefits. This research provides quantitative economic evidence that substance abuse treatment reduces recidivism in California.

The three treatment eligible groups and their subsequent recidivism rates are examined for offenders who were paroled in fiscal year 2005/2006. Treatment is expected to have the largest effect on a substance-abusing individual’s recidivism. Offenders who complete both in-prison and community aftercare substance abuse treatment programs are expected to have the lowest recidivism rates. Those who complete in-prison treatment only are also expected to have reduced recidivism rates relative to non-treated offenders’ recidivism rates, as some treatment is expected to reduce recidivism than no treatment. Non-treated offenders are expected to have the highest recidivism rates. Recidivism is defined as a binary variable which takes on a value of 1, if the offender returns to prison during the observation period, and 0 otherwise. A probit regression is used to estimate the effect completion of a substance abuse treatment program has on the recidivism rate.

Substance abuse treatment services were provided to 32,410 substance-abusing offenders. Substance abusing offenders are those individuals who are in prison for drug
offenses. At the one year and two year mark, offenders who completed both in-prison and community aftercare substance abuse treatment had a return to prison rate of 21.9 percent after one year and 35.3 percent after two years. Recidivism increased for offenders who completed an in-prison treatment program only, with a return to prison rate of 34.3 percent after one year and 49.1 percent after two years. Non-treated offenders fared the worst with recidivism rates of 39.9 percent after one year and 54.2 percent after two years. The probability of recidivism for offenders who complete both in-prison and aftercare treatment programs is 18 percent lower than non-treated offenders, estimating an annual cost savings of 39 million dollars. The probability of recidivism for offenders who completed in-prison only treatment is 15 percent lower than non-treated offenders, estimating an annual cost savings of 63 million dollars.

The remainder of the thesis is structured as follows: Chapter II reviews the literature on offender treatment programs, and their economic implications. Chapter III describes the data, expected results, empirical model, and statistical analysis. Chapter IV presents results, and discusses the cost analysis. Chapter V concludes with a review of research limitations, a discussion of policy implications, and recommendations for future studies.
Chapter 2
LITERATURE REVIEW

Substance abuse is a common factor among incarcerated inmates (French et al., 2010). Identification and treatment of substance abuse disorders among drug addicted inmates are critical components of successful rehabilitation. Without addressing underlying substance use behaviors, parolees are significantly more likely to recidivate within one year of release (French et al.). Punishment alone shows little success as a deterrent to substance abuse (Hepburn, 2005), and releasing subjects without treatment contributes to what has become known as the “revolving door” of corrections (McCollister et al., 2003). Using multivariate survival models and cost-effectiveness analysis respectively, Hepburn and McCollister et al. conclude treatment is a much more effective, and economical, alternative to reducing recidivism that is due to substance abuse. Because drugs and crime are inextricably interrelated (Hiller et al., 1999), and substance abuse disorders are common conditions among repeat criminal offenders (French et al.), the likelihood of recidivism grows with the number of offenders’ convictions (Field, 1998). Employing regression analysis, Field approximates 63 percent of offenders with more than two convictions have used drugs, compared with 81 percent of offenders with five or more convictions. Predictably, many of the new inmates entering incarceration are actually returning offenders (French et al.), thus contributing to a high recidivism rate.
To combat high return to prison rates, institutions invest substantial resources into substance abuse treatment programs, providing substance-abusing offenders with both in-prison treatment (Wexler et al., 1990), and residential aftercare (Hiller et al., 1999). Recidivism rates are subsequently analyzed to determine the treatment effect of institutionalized programming on treated versus untreated offenders (Wexler et al.). Broadening research, Hiller et al. study the impact of residential aftercare programs on recidivism rates following in-prison substance abuse treatment for offenders whom were incarcerated for drug offenses. Examination of treatment program evaluations effectively provides quantifiable comparisons of residential aftercare substance abuse treatment programs to stand-alone in-prison substance abuse treatment programs to correction unaccompanied by rehabilitation. However, the efficacy of these programs is debatable, and very few have been subjected to economic evaluation. Given current fiscal realities of shrinking state budgets and increased competition for resources, however, taxpayer supported programs such as these must clearly demonstrate economic, as well as clinical benefits for sustainability and growth (French et al., 2010).

Prior research supports the notion that punishment without treatment is not successful at reducing recidivism (Ax et al., 2007; Clements et al., 2007; Wormith et al., 2007) as it alone is rarely a deterrent for substance abusing behaviors. Bringing into play applications of meta-analytic practices to establish effective correctional intervention, all find little evidence that punishment alone reduces recidivism, especially among substance abusing offenders. However, prior to implementation of treatment, punishment was the only way to deter substance abuse. Reasoning for punishment came from the assumption
that a rational person, having already been punished for past criminal behavior and wanting to avoid the future pains of punishment, chooses not to commit future criminal behaviors (Hepburn, 2005). Hepburn addresses the argument that punishment unaided does not reduce recidivism due to substance abuse; instead, if recidivism is to be abridged, treatment is more effective than punishment at reducing the probability of subsequent criminal behavior.

Hepburn (2005) collected data from the Office of the County Attorney in Maricopa County, Arizona on 3,328 offenders who were arrested during a 24-month period between March 1989 and March 1991 for substance abuse offenses. All 3,328 offenders were eligible for diversion from prosecution by choosing substance abuse treatment programs instead of prison time. However, of the 3,328 offenders, 1,558 did not enter treatment, 493 offenders entered treatment but dropped out before completing the program, leaving 1,277 subjects who entered and successfully completed treatment. These three treatment eligible groups were then observed, and recidivism rates tracked, over a five-year follow-up period. In this study, recidivism is defined as a subsequent arrest for any charge. Individual level characteristics of the sample include the subjects’ race, age, criminal record, and commitment offense type for offender demographic purposes.

To compare the outcome differences among groups, Hepburn (2005) used bivariate analysis to determine recidivism rates by exposure to treatment, and multivariate hazard models to determine the survival rates for recidivism. Bivariate analysis is a continuous treatment outcome which measures the numbers of days without
re-arrest. Hazard models examine whether the treatment changes the survival probability that a treated offender is not re-arrested over the observation period. Hazard analyses included both parametric and semi-parametric models to study the “time to failure.” The effect of exposure to treatment on recidivism is analyzed by regression equations which are estimated using “time to failure” parametric exponential hazard analysis, procedures that allow estimation of the net effects of the independent variables on recidivism.

With results finding that recidivism outcomes vary substantially among the three treatment-eligible groups with 52 percent of the substance-abusing offenders who received no treatment re-arrested during the follow-up period, 43 percent of treatment program dropouts re-arrested, and 22 percent of program completers re-arrested, the bivariate outcomes suggest that recidivism rates are affected by exposure to treatment. “Time to failure” is also significantly affected by exposure to treatment, echoing bivariate outcome results, with the most significant positive effect occurring when substance abuse treatment has been successfully completed. Therefore, the implications of these results show that punishment alone has little success as a deterrent to crime among substance abusing offenders with over half re-entering incarceration. However, with less than one-third recidivating after the completion of treatment programming, treatment is more effective alternative to reducing recidivism that is due to substance abuse offenses.

With the implementation of treatment, offender treatment programs were shown to be particularly effective for substance abusing offenders in reducing recidivism (French et al., 2010; Belenko et al., 2005). Using longitudinal data from the New Jersey Department of Corrections (NJDOC) French et al. examine 176 randomly-selected
subjects who completed the continuum of care treatment and were released in year 2000 relative to a matched comparison control group of 395 randomly selected subjects who were released the same year, but while eligible for, did not receive any substance abuse treatment. It is important to note that while both groups were eligible for participation in treatment programs, participation in treatment is not random as subjects are not randomly selected for treatment but rather are selected based on the severity of their substance abuse needs. Recidivism data was then gathered on the subjects observed following a one year post release period. Data collected on the subjects include the date on which the offender was released, date of re-arrest, type of crime committed, whether the subject was reconvicted, and whether the subject was re-incarcerated. Individual characteristics such as the offender’s age, race, and commitment offense were also included to provide demographic and descriptive statistics.

Estimation methods used by French et al. (2010) include bivariate analysis, multivariate regression, and three variations of hazard models. French et al. use bivariate analysis to examine the days without re-arrest, any re-arrest, any re-conviction, and any re-incarceration. Bivariate analysis, however, cannot adjust for background characteristics and other offender differences such as date of release, race, and previous criminal activity; therefore, a multivariate regression analysis is used to control for these factors. In conducting multivariate regression analyses, French et al. use ordinary least squares (OLS) regression to estimate days without re-arrest, and logistic regression to estimate the binary outcomes of re-arrest, re-conviction, and re-incarceration. The
exponential and Weibull models were used in estimating the parametric hazard analysis; the Cox model was used in estimating the semi-parametric hazard analysis.

Earlier studies of in-prison treatment programs found treatment was associated with a reduced re-arrest and reconviction rate (Field, 1985, 1989, 1992; Wexler et al., 1990, 1992). More recent research has shown similar findings as well (Martin et al., 1995; Knight et al., 1997; Wexler et al., 1999; French et al., 2010). Hiller, Knight, and Simpson (1999) compare re-incarceration rates of subjects who received in-prison treatment only, both in-prison and aftercare treatment, and those who were not exposed to treatment. Using data collected on 396 male inmates of which 293 had undergone treatment and 103 were untreated, participants were randomly-selected from an in-prison therapeutic community and three residential aftercare programs. Individual level data such as the offender’s gender, ethnicity, age, education level, criminal history, and risk for recidivism were obtained from the Texas Department Criminal Justice Institutional Division database. Post-release recidivism was based on subsequent re-arrests found in the Texas Department of Public Safety Criminal History Record Information database.

Hiller, Knight, and Simpson (1999) utilize bivariate analysis to examine the relationship between dates of prison release to time of first re-arrest, and survival regression analysis, by use of the semi-parametric Cox hazard model, to make multivariate associations between predictor variables and time of re-arrest. The resulting findings support the original hypotheses that among the three treatment eligible groups, offenders who receive both in-prison and aftercare treatment have the lowest likelihood of recidivism. Results show that parolees who complete both residential aftercare
treatment and in-prison substance abuse treatment do indeed have the lowest recidivism rate (30 percent). Subjects who receive in-prison substance abuse treatment only have a lower recidivism rate (36 percent) than those who do not receive treatment (42 percent). They suggest that corrections-based treatment should emphasize a continuum of high quality programming and service treatment models that extend from the institution in-prison substance abuse treatment to the community residential aftercare treatment.

Like French et al. (2010), Fretz, Heilbrun, and Brown (2005) also use longitudinal data on offenders released in year 2000 from the NJDOC to find that subjects who completed treatment had significantly lower probabilities of re-arrest, reconviction, and re-incarceration at the 6-, 9-, and 12-month follow-up period than offenders who received no treatment. Employing bivariate analysis and multivariate regression, they compared the rates of re-arrests, reconvictions, and re-incarcerations of 177 offenders who completed treatment with the rate of re-arrests, reconvictions, and re-incarcerations of 400 offenders who were released without treatment, finding reduced recidivism rates across all continuums for substance-abusing offenders who completed substance abuse treatment programs.

Reduced recidivism rates are shown from their results findings: at the 6-month follow-up, 19.8 percent of treated offenders had been re-arrested, compared to 30.5 percent of control group offenders. At the 9-month follow-up period, 29.5 percent of treated offenders were re-arrested, compared to 40.3 percent of untreated offenders. At the one-year mark, 34.5 percent of the treatment group had been re-arrested, compared to 47 percent of the control group. Re-conviction rates follow a similar pattern: at the 6-
month follow-up, 14.8 percent of offenders in the treated group had been re-convicted, compared to 25 percent of subjects in the control group. Increasing to 21.6 percent for the treated group and 31.5 percent for the control group at the 9-month follow-up, re-conviction rates are higher for offenders who leave incarceration without treatment. At the one-year mark, 25 percent of offenders who received treatment were re-convicted, compared to 36 percent of offenders in the control group. Returned to prison offenders show the re-incarceration rates for treated versus untreated subjects: at the 6-month follow-up, 13.6 percent of treated offenders were re-incarcerated, compared to 21.8 percent of subjects in the control group. At the 9-month mark, 18.2 percent of treated subjects were re-incarcerated, compared to 26.8 percent of control group subjects. At the one-year mark, 21 percent of offenders who received treatment were re-incarcerated, compared to 29.3 percent of offenders not exposed to treatment. These results suggest treatment lowers recidivism rates in the follow-up one-year post-release period.

French et al. (2010) also found strong evidence that treatment reduces post-release recidivism and return to confinement. Empirical results suggest that subjects in the treatment group had, on average, 296 days without re-arrest in the observation period, compared to 260 days for control group subjects, a difference that is statistically significant at the one percent level. Re-arrest, reconviction, and re-incarceration rates were also lower for offenders who received treatment, with 36 percent of offenders in the treatment group and 48 percent of offenders in the control group re-arrested in the one-year post release period. 25 percent of offenders who received treatment, compared to 37 percent of offenders not exposed to treatment were reconvicted, and 21 percent of treated
subjects were re-incarcerated, compared to 30 percent of non-treated subjects. Bivariate analysis, multivariate regression, and hazard analysis techniques all strongly support the hypothesis that treatment reduces recidivism among substance abusing offenders.

While various offender treatment programs have proven effective, studies on the cost-effectiveness of providing treatment have been few and far between. Of the few such studies that have been conducted, economic evaluation of correctional interventions show benefits exceed costs (Farrington et al., 2001; Welsh and Farrington, 2000). Utilizing cost-benefit estimation methods, Welsh and Farrington examine both the methodological and empirical contribution of correctional intervention programs designed at reducing re-offending. Results of their study indicate the benefits of correctional interventions outweigh their costs, even when taking into account that benefits tend to be estimated conservatively, whereas costs are taken fully into account, as governmental fiscal analyses tend to overestimate costs and underestimate benefits; cost over-estimation is a consistent result in modeling expenditures. Results from Welsh and Farrington illustrate an optimistic outlook with benefits exceeding costs of treatment providing evidence of cost-savings. Taking a slightly different approach where only the resources used are observed, Belenko, Patapis, and French (2005) employ a cost-effectiveness estimation method to review a corrections-based economic study of substance abuse treatment to find that treatment significantly reduces drug use and subsequent criminal behavior. Not only this, but economic analyses also consistently find robust results related to the positive economic net benefits of crime reduction (French et al., 2010; McCollister et al., 2004; Daley et al., 2004; Griffith et al., 1999).
Deriving average crime cost estimates for various criminal activities where the valuation of arrest, conviction, incarceration, wage loss, and victim loss were assessed, French et al. (2010) found that relative to a matched comparison group of offenders who did not receive treatment, the intervention group returned an average economic benefit of $4,307 to $6,209 over the one-year post-release period. McCollister et al. (2004) found the incremental cost-effectiveness ratio for all treatment clients, compared to the untreated group, was $65 per incarceration day avoided. Daley et al. (2004) examined the costs and benefits of prison treatment programs, where they found a significant reduction in re-arrest for subjects in the treatment group (37.4 percent) during the one year follow up period compared to subjects of the untreated comparison group (46 percent). The benefits of providing treatment, measured in terms of the costs of avoided re-incarceration, were from 1.8 to 5.7 times the cost of implementing the treatment programs. Griffith et al. (1999) studied the cost effectiveness of the in-prison treatment program with three year outcome data, finding intensive services were most cost-effective when both in-prison and aftercare treatment were completed. According to Griffith et al. (1999), as the largest economic impact is evident among high-risk offenders, assignments to correctional treatment need to consider offender risk level of re-offense and make every effort to engage offenders in community aftercare treatment to realize optimal treatment results.

The Washington State Institute for Public Policy (2006) evaluated various types of drug treatment programs and found that the in-prison and community aftercare program reduced recidivism by seven percent. Coinciding with research done by the
University of California, Los Angeles (2007), in-prison substance abuse treatment programming with continued community aftercare treatment works best at reducing recidivism if the client follows through on both programs, bringing significant savings to the state. A seven percent reduction in long-term recidivism among the 9,200 California inmates receiving substance abuse treatment translates into 640 fewer inmates returning to prison and an annual savings of nearly $40 million in reduced custody and prison costs to taxpayers.

The literature on the effectiveness of prison-based drug treatment appears to have reached a consensus that the benefits of in-prison treatment are magnified and sustained when offenders participate in aftercare services following their release from prison (Inciardi et al., 2004). Thus, in order to ensure long term benefits of prison-based treatment, institutional treatment must be followed by continued treatment in the community with residential aftercare (Hiller et al., 1999). Preceding research shows that in-prison treatment in combination with continued community aftercare treatment is most effective in reducing recidivism; therefore, treatment is expected to have the largest effect on a substance-abusing offenders’ recidivism.

This expectation comes from the consensus that treatment works. This is shown to be true even when comparing across states and over time. As seen from the Literature Review Research Studies Summary Data (shown in Table 1), similar treatment results of reduced recidivism are found across states with research conducted in Texas, Connecticut, Arizona, and New Jersey, as well as throughout different time periods in 1999, 2004, 2005, and 2010, respectively (Hiller et al., 1999; Daley et al., 2004;
Hepburn, 2005; French et al., 2010), showing treated offenders return to prison at much lower rates both across states and over time.

Table 1 Literature Review Research Studies Summary Data

<table>
<thead>
<tr>
<th>STUDY (AUTHORS)</th>
<th>TIME FRAME</th>
<th>DATA</th>
<th>METHODS</th>
<th>RESULTS</th>
<th>IMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>French, M.T., Fang, H., and Fretz, R. (2010)</td>
<td>Released in year 2000; one year recidivism tracking period</td>
<td>New Jersey Dept. of Corrections; 176 treated subjects, 395 non-treated subjects; Variables: race, age, commitment offense.</td>
<td>Two treatment eligible groups; bivariate analysis, multivariate regression, exponential, Weibull, and Cox hazard model analyses.</td>
<td>Treated subjects: 296 days without re-arrest; 260 days for control group subjects. 36% of treated subjects re-arrested, 48% of un-treated re-arrested; 25% of treated offenders re-convicted, 37% un-treated re-convicted; 21% treated subjects re-incarcerated, 30% non-treated re-incarcerated.</td>
<td>Strong evidence treatment reduces recidivism and return to confinement during one-year period following treatment and parole.</td>
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<tr>
<td>Hepburn, J. (2005)</td>
<td>March 1989-March 1991; five year recidivism tracking period</td>
<td>Maricopa, Arizona; 3,328 offenders; No Treatment: 1,558; Drop-outs: 493; Treated: 1,227;</td>
<td>Three treatment eligible groups; bivariate analysis, multivariate survival models, “time to failure” parametric exponential hazard analysis</td>
<td>Offender recidivism: No treatment: 52% re-arrested; Drop-outs: 43% re-arrested; Treated: 22% re-arrested.</td>
<td>Recidivism rates affected by exposure to treatment; most significant positive effect when treatment successfully completed.</td>
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<td>Hiller, M.L., Knight, K., and Simpson, D.D. (1999)</td>
<td>Released from prison in 1994; one year recidivism tracking period.</td>
<td>Kyle, Texas; 396 male inmates, 293 treated; 103 un-treated; Variables: offender gender, ethnicity, age, education level, criminal history, risk</td>
<td>Three treatment eligible groups; match group quasi-experimental design, bivariate analysis, Cox model survival regression hazard analysis</td>
<td>Offenders completing in-prison plus aftercare have lowest likelihood of recidivism (30%). In-prison only subjects recidivate at a higher rate (36%). Non-treated subjects showed the highest recidivism rate (42%).</td>
<td>Treatment needs to emphasize a continuum of programming that extends from the institution to aftercare treatment.</td>
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<tr>
<td>Fretz R., Heilbrun, K.S., and Brown, D. (2005)</td>
<td>Released in year 2000; one year recidivism tracking period.</td>
<td>New Jersey Dept. of Corrections; 177 treated subjects; 400 non-treated subjects; Variables: race, drug use, criminal history, commitment offense.</td>
<td>Two treatment eligible groups; bivariate analysis, multivariate regression observed at 6-, 9-, and 12-month follow-ups.</td>
<td>Re-arrest rates: 6-months: 19.8% (treatment), 30.5% (control); 9-months: 29.5% (treatment), 40.3% (control); 12-months: 34.5% (treatment), 47% (control). Re-conviction rates: at 6-months: 14.8% (treatment), 25% (control); 9-months: 21.6% (treatment), 31.5% (control); 12-months: 25% (treatment), 36% (control). Re-incarceration rates: at 6-months: 13.6% (treatment), 21.8% (control); 9-months: 18.2% (treatment), 26.8% (control); 12-months: 21% (treatment), 29.3% (control).</td>
<td>Treatment lowers recidivism rates in post-release periods; reduced recidivism for offenders who complete drug treatment programming.</td>
</tr>
</tbody>
</table>
Griffith, J.D., Knight, M.L., Knight, K., Simpson, D.D. (2005). Released from prison in 1994; three year recidivism outcome tracking data. Kyle, Texas; 394 male parolees; 291 treated, 103 untreated; Variables: gender, ethnicity, age, education level, drug use, criminal history, risk. Two treatment eligible groups; Cost-effectiveness analysis, focused on costs to the justice system to process and house re-offenders. Treatment services cost-effective only when entire treatment continuum completed; largest economic impact evident among high-risk cases. Assignments to correctional treatment need to consider offender risk level of re-offense; make every effort to engage offenders in community aftercare treatment.

Daley, M., Love, C.T., Shepard, D.S., Peterson, C.B., White, K.L., Hall, F.B. (2004) Released from prison during FY1996-FY1997; two year recidivism follow-up tracking period. Connecticut Dept. of Corrections; 831 inmates: 358 treated, 473 non-treated offenders; Effectiveness measured by reductions in likelihood of re-arrest within 6-months, 1-year, and 18-months post-release. Two treatment eligible groups; cost-benefit analysis, benefits measurement: measured in terms of costs of avoided reincarceration. Significant reduction in re-arrest for treated offenders in comparison to matched group of untreated offenders; 46% of un-treated offenders re-arrest within first year of release. 37.4% of treated offenders re-arrested within first year of release. Cost-benefit analysis: benefit of 1.8 to 5.7 times the cost of providing treatment. Favorable return on investment to taxpayers; inmate who gets re-arrested costs 5.7 times the cost of treatment. Need to find ways to ensure more substance-abusing offenders receive substance abuse treatment.

This research focuses on analyzing the effectiveness and cost-effectiveness of California’s in-prison and community aftercare substance abuse treatment programs and their impact on subsequent recidivism. Previous research (Hiller et al., 1999; Inciardi et al., 2004) has found that offenders who complete in-prison and community aftercare treatment have the lowest recidivism rates of the three treatment eligible groups. This study will follow the same structure design as Hiller et al., estimating a model of three treatment eligible groups with recidivism outcome expectations that offenders who
complete both in-prison and community aftercare treatment have the lowest recidivism rates of the three treatment eligible groups, followed by in-prison treatment only, with non-treated offenders expected to have the highest recidivism rates.

The evaluation of different treatment outcomes provides policy recommendations of where best to invest for optimal recidivism outcomes. The importance of research on residential aftercare is its potential for improving substance abusing parolee outcomes. Based on the supposition that parolees who complete residential aftercare treatment in conjunction with in-prison substance abuse treatment are expected to have the lowest recidivism rate, and offenders who complete an in-prison substance abuse treatment program only are expected to have a lower recidivism rate than non-treated offenders. The literature supports the hypothesis, and the expectation for this research is the same; parolees who complete both residential aftercare treatment and in-prison substance abuse treatment have the lowest recidivism rate of the three treatment eligible groups. Therefore, implications (Hiller et al., 1999) suggest that corrections-based treatment should emphasize a continuum of programming and treatment that extend from the institution in-prison substance abuse treatment to the community residential aftercare treatment for optimum results.

In addition to matching structure design, individual level characteristics are also chosen based on the research of Hiller et al. (1999), as well as that of Hepburn (2005) and French et al. (2010). Chosen variables include subject age, gender, race, commitment offense, in-prison substance abuse treatment completion, and community aftercare
treatment completion. Offender age, gender, race, and commitment offense are included as factors that may influence offender recidivism.

In terms of cost-savings, investing in both in-prison treatment and community aftercare programs is an advisable alternative when compared to incarceration without treatment. Griffith et al., 1999, McCollister et al., 2004, and Belenko et al., 2005 using a cost-effective methodological approach, all find treatment to be a worthwhile asset in recidivism reduction. Thus, if in-prison treatment is completed in conjunction with community aftercare, substance abuse treatment programs yield the greatest clinical as well as economic benefits in terms of lowered recidivism and substantial cost savings. The similarities of cost-effectiveness research coincides with other cost analysis studies in that, given successful completion, substance abuse treatment is effective and cost saving through reduced return to prison rates for substance abusing offenders.

Corroborating with Welsh and Farrington’s (2000) findings, French et al. (2010) examine the economic benefits of providing in-prison substance abuse treatment programs, finding that benefits outweigh the costs of providing treatment. Analyzing cost savings, French et al. discover that relative to the matched comparison group of offenders who did not receive treatment, the treatment group returned significant savings over the one year post-release period. The implications of these results provide quantitative economic evidence that providing inmates with in-prison substance abuse treatment is an economically sound recidivism combative strategy.

Most previous studies use either bivariate analysis, multivariate regression, or various hazard analyses. In this study, a different methodological approach was chosen to
see if a different empirical model would produce different empirical results or echo those already found by the aforementioned methods. Choosing this alternate approach, the empirical model used to analyze recidivism in this research study categorizes the dependent variable as a discrete, binary [0, 1] variable; therefore, a linear probability model will not be used to measure recidivism since the probability of the dependent variable is not necessarily linear. Given the discrete [0, 1] dependent variable, a probit regression will be used to satisfy the nonlinear functional form of the model. The interpretation of probit results differs from other estimation techniques in that estimated coefficients reflect probabilities rather than variable units. A probit regression explains how completion of one of the three substance abuse treatment eligible programs affects the recidivism rate.
Chapter 3

ESTIMATION METHODOLOGY AND STATISTICAL ANALYSIS

Participant demographic and treatment data come from CDCR’s Offender Information Services Branch which collects individual level data on inmates both in treatment and those eligible for, but not participating in, in-prison treatment, as well as parolees in CDCR’s community aftercare substance abuse treatment programs. Individual level variables used in explaining recidivism rates include offender age, gender, race, commitment offense, completion status of an in-prison treatment program, and completion status of a community aftercare program by the offender.

All independent variables are expected to have a statistically significant effect on an offender recidivating. Age is expected to have a negative correlation with recidivism as people tend to age out of criminal activities. Therefore, as an offender gets older, he/she is less likely to recidivate. Gender a dummy variable with 1 if female, 0 male, is expected to have a negative correlation with recidivism as, on average, male offenders tend to return to prison at higher rates than female offenders. Females are also shown to be very responsive to substance abuse treatment. In-prison and community aftercare completion and treatment, measured by a [0, 1] dummy variable with 1 if treatment completed, 0 otherwise, are expected to have a negative correlation as treatment is expected to reduce recidivism. Race, a dummy variable measured with 1 if White, 0 otherwise, is expected to have a negative correlation with recidivism as minorities tend to recidivate at higher rates than Caucasians. Inmates also are placed in substance abuse
treatment based on certain criteria, one of which is race; this is so no one race is more prevalent in treatment than another. Therefore, those chosen for treatment are not necessarily indicative of the general inmate population. Offender commitment offense, a dummy variable measured by 1 if drug offenses, 0 otherwise, is expected to have a positive correlation with recidivism as substance abusing offenders recidivate at higher rates than other commitment offenses. Reason for incarceration provides insight into offender’s risk level and priority for treatment.

Inmates serving time for drug crimes have the highest risk for recidivism, and therefore first priority for substance abuse treatment. Offender risk level is classified into three separate categories of high, moderate, or low risk. Risk classification is determined by an assessment of qualifying factors for propensity to recidivate based on inmate self-identifying answers regarding their monetary situations, socioeconomic status, psychological needs, emotional and mental states, and family tie characteristics. Research with general population inmates consistently shows that high-risk cases have serious problems and re-offend at significantly higher rates following release (Griffith et al., 1999). Therefore, inmates classified as high risk get first priority into treatment as high risk inmates are seen with the greatest risk to recidivate if not given treatment. Inmates classified as being a moderate risk have next priority, and inmates with low risk classification are noted for treatment but are not priority for receiving treatment services. In this way, treatment recipients are not randomly selected, thus, data analyzed is not gathered from a random sample of prison inmates. Those selected for treatment would
likely have recidivated at a higher rate without treatment than the no treatment control group.

Three treatment eligible groups, in-prison with aftercare, in-prison only, or no treatment, and their subsequent one and two year recidivism rates are examined for offenders paroled in fiscal year 2005/2006. Classified into three distinct categories, treatment groups differ by offenders classified as high-to-moderate risk to re-offend who fulfilled both in in-prison treatment programming in conjunction with community aftercare therapy, high-to-moderate risk to re-offend offenders who completed in-prison treatment while institutionalized, and low risk offenders who received no exposure to treatment during incarceration. The relationship between completion of in-prison and community aftercare treatment, completion of in-prison treatment only, and no treatment exposure and subsequent recidivism rates determine if substance abuse treatment is effective at reducing the number of offenders who return to prison within the observed time frame. To create a baseline from which to measure the effects of therapy, offenders not exposed to treatment compose the control group, against which both treatment groups are evaluated to determine if, and how, treatment affects the recidivism rate.

Recidivism is defined as a paroled offender returning to prison for any reason in the observation period, and categorized as a binary variable which takes on a value of either 0 or 1, depending on offender recidivism outcomes; 1 if the offender recidivates, 0 otherwise, as observed during the one year and two year follow-up period. A probit model is the best chosen when the dependent variable is a binary, dichotomous response, categorized by a [0, 1] outcome. This regression technique is a transformation of the
standard regression model which calculates the predicted probability based on predictor variables. Given binary dependent variable outcomes, the lowest predicted outcome equals 0, signifying the event did not occur. However, in the event of an occurrence, the probit model predicts the event equal to 1.

Probit regression results differ from other estimation techniques in that interpretation is based on probabilities instead of variable units. In a linear probability model, the effect on the dependent variable (Y) given a unit change in the independent variable (X) is the expected change in Y arising from the unit change in X. However, when the dependent variable is binary [0,1], its conditional expectation is the conditional probability that Y=1, so the expected change in the dependent variable arising for a unit change in X is the change in the probability that the dependent variable equals 1. Therefore, in the probit regression model, a unit change in the independent variables gives the estimated effect on the probability that the dependent variable equals 1 (Stock and Watson, 2007). In this model, the probit regression (using dprobit for marginal effects), shows how completion of a substance abuse treatment program (completion of both in-prison and community aftercare treatment, completion of in-prison substance abuse treatment only, or no treatment) affects the rate a released inmate recidivates.

Treatment services are provided by the CDCR, which operates thirty-four prisons throughout the state, twenty of which administer rehabilitative in-prison substance abuse treatment programming to substance abusing offenders. CDCR’s contracted treatment providers manage community aftercare services through which California parolees are provided services at forty-one residential treatment centers. A total of 32,410 offenders...
received substance abuse treatment and were discharged from treatment in FY 2005/2006. A matched comparison control group of 32,318 inmates who were eligible for, but did not receive, treatment were paroled from incarceration the same year. Of the two treatment groups that partook in treatment services, 21,464 inmate participants were provided with in-prison treatment only and 10,946 parolees chose to participate in community aftercare substance abuse treatment upon completion of the in-prison substance abuse treatment program.

**Offender Demographics**

A breakdown by gender of treated offenders (n=32,410) reveals 25,400 males (78.4 percent), and 7,010 females. A breakdown by age reveals a very small percentage of treatment participants are 20 years old or younger at 0.3 percent, then jumping slightly for offenders aged between 21-35 years old at 1.9 percent. The biggest portion of substance abusing offenders receiving treatment is between 36-50 years of age at 45.2 percent, which decreases only slightly for offenders who are between 51-65 years of age at 43.9 percent. There is a dramatic decrease for participants in treatment who are aged 66 years or older at only 8.7 percent. The median age of offenders receiving treatment in substance abuse programs is 36 years of age. Participant race was divided into four categories in which a breakdown of each revealed 36.9 percent White, 29.1 percent Black, 30.5 percent Hispanic, and 3.5 percent Other. As to why an offender is in prison, a breakdown of offender offense reveals 42.5 percent drug crimes, 26.5 percent property crimes, 22.7 percent crimes against persons, and 8.3 percent other crimes. Of the treated
offender population, 57.7 percent of those in in-prison substance abuse treatment (n=21,464) completed the program; of released offenders in community aftercare (n=10,946), only 33.8 percent of parolees completed treatment.

The matched comparison control group is offenders who were eligible for treatment, but were incarcerated without any rehabilitative programming. Control group offender characteristics (n=32,318), breakdown by gender reveals 28,657 males (88.5 percent), and 3,707 females. A breakdown by age reveals there are very few eligible young people with only one percent of inmates being 20 years old or younger. The majority of eligible offenders in prison (52.5 percent) fall between the ages of 21-35 years old. This number falls slightly to 38.7 percent for 36-50 year olds, and continues to decrease for 51-65 year olds incarcerated at 6.7 percent. Lastly, like very young offenders, there are few very old people in prison who were eligible but did not participate in treatment with only 1.1 percent of those aged 66 years old or older incarcerated. The median age of incarcerated eligible offenders is 37 years of age, which is slightly older than the median age of 36 for substance abuse treatment programming participants; however, there is no statistically significant difference between the median age of incarcerated eligible offenders who did not participate in treatment and those participating in treatment services. Participant race was divided into four categories in which a breakdown of each revealed 31.0 percent White, 24.0 percent Black, 40.6 percent Hispanic, and 4.4 percent Other. Offender commitment type for eligible non-participants reveals 32.5 percent drug crimes, 34.2 percent property crimes, 21.8 percent crimes
against persons, and 11.5 percent other crimes. Treatment and control group offender
descriptive statistics are summarized in Table 2 below:

Table 2 Offender Descriptive Statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Treatment Group (n=32,410)</th>
<th>Control Group (n=32,318)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>78.4</td>
<td>88.5</td>
</tr>
<tr>
<td>Female</td>
<td>21.6</td>
<td>11.5</td>
</tr>
<tr>
<td>Age (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 or younger</td>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>21-35</td>
<td>1.9</td>
<td>52.5</td>
</tr>
<tr>
<td>36-50</td>
<td>45.2</td>
<td>38.7</td>
</tr>
<tr>
<td>51-65</td>
<td>43.9</td>
<td>6.7</td>
</tr>
<tr>
<td>66 or older</td>
<td>8.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>36.9</td>
<td>31.0</td>
</tr>
<tr>
<td>Black</td>
<td>29.1</td>
<td>24.0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>30.5</td>
<td>40.6</td>
</tr>
<tr>
<td>Other</td>
<td>3.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Commitment Type (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>42.5</td>
<td>32.5</td>
</tr>
<tr>
<td>Property</td>
<td>26.5</td>
<td>34.2</td>
</tr>
<tr>
<td>Persons</td>
<td>22.7</td>
<td>21.8</td>
</tr>
<tr>
<td>Other</td>
<td>8.3</td>
<td>11.5</td>
</tr>
<tr>
<td>Treatment (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-prison Treatment (n=21,464)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>57.7</td>
<td></td>
</tr>
<tr>
<td>Did not complete</td>
<td>42.3</td>
<td></td>
</tr>
<tr>
<td>Aftercare Treatment (n=10,946)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>33.8</td>
<td></td>
</tr>
<tr>
<td>Did not complete</td>
<td>66.2</td>
<td></td>
</tr>
</tbody>
</table>

Offender Recidivism

Recidivism outcomes are expected to vary substantially among the three-
treatment eligible groups. Treatment is expected to have the largest effect on a substance
abusing offenders’ recidivism. Offenders who complete both in-prison and community aftercare substance abuse treatment programs are expected to have the lowest recidivism rates. Those who complete in-prison treatment only are expected to have reduced recidivism rates, as some treatment is expected to be better than no treatment. Offenders not exposed to treatment are expected to have the highest recidivism rates. Reasoning for these expectations come from literature review findings, which support substance abuse treatment programs as being particularly effective for reducing recidivism among substance abusing offenders.

![Figure 1 One and Two Year Recidivism Rates for Offenders Paroled Fiscal Year 2005/2006](image)
Recidivism data show those subjects who completed both an in-prison and community aftercare substance abuse treatment program in fiscal year 2005/2006 had a return to prison rate of 21.9 percent after one year and 35.3 percent after two years. The recidivism rate increases for offenders who completed only an in-prison treatment program. They returned to prison at a rate of 34.3 percent after one year and 49.1 percent after two years. Untreated offenders fared the worst with recidivism rates of 39.9 percent after one year and 54.2 percent after two years (shown in Figure 1). These return to prison rates show that any treatment is better than no treatment in reducing recidivism among substance abusing offenders. Those who completed both an in-prison and community aftercare treatment program fared best in not returning to prison.

**Recidivism Breakdown by Gender**

![Graph showing recidivism rates by gender and treatment type]

*Figure 2 One and Two Year Recidivism Rates for Male Offenders Paroled FY 2005/2006*
Offender recidivism breakdown by gender reveals male offenders (shown in Figure 2) who complete both in-prison and community aftercare substance abuse treatment have lower recidivism rates at 25.4 percent after one year and 40.4 percent after two years, than male offenders who receive no treatment whose recidivism rate is 41.2 percent after one year and 55.6 percent after two years. Males who complete only an in-prison substance abuse treatment program, but no subsequent community aftercare, recidivate at a lower rate at the one year mark at 39.8 percent, but at a slightly higher rate at the two year mark at 55.8 percent. Why male offenders who receive in-prison treatment only recidivate at a slightly higher rate (55.8 percent) than non-treated offenders (55.6 percent) is a curious result, however, recall that offenders in treatment are already deemed high risk to re-offend and without treatment would re-offend at higher rates. Therefore, the reduction in recidivism is more than likely underestimated since those offenders receiving treatment are expected to have higher recidivism rates to begin with. It is important, however, to note that the one year and two year rates differences are not statistically significant between the in-prison treatment only and no treatment groups. Moreover, it looks like in-prison treatment has no effect on recidivism unless followed by aftercare treatment. Perhaps, aftercare treatment follow-up to in-prison treatment is more crucial for male offenders to lowering their chances of recidivism. Nonetheless, male participants who complete both programs show to have lower recidivism rates than male offenders who receive only in-prison treatment or no treatment at all.
Female offenders (shown in Figure 3) who completed both in-prison substance abuse treatment and community aftercare treatment recidivated at significantly lower rates when compared to non-treated female offenders with rates of 8.8 percent after one year and 16.5 percent after two years, compared to 30.1 percent after one year and 43.7 percent after two years, respectively. When looking at female offenders who had in-prison treatment only, 25.0 percent recidivated after one year and 37.7 percent recidivated after two years which is still lower than non-treated female offenders. Unlike substance abusing male offenders, any exposure to treatment is shown to be beneficial for female drug offenders as it significantly reduces their chances of recidivating.

Data illustrates the stark differences between genders, with female offenders exhibiting a far lower recidivism rate compared to male offenders across all categories.
For females, any exposure to treatment, be it in-prison or followed up with aftercare services, reduces recidivism rates in both the one year and two year observation period. However, it is important to note, both male and female offenders who successfully complete in-prison treatment in conjunction with community aftercare treatment programs have significantly lower recidivism rates than offenders who do not receive treatment. Therefore, substance abuse treatment appears to be beneficial in reducing the return to prison rate for substance abusing offenders in California.

A recidivism trend analysis (shown in Figure 4) over the one year and two year observation period for all offenders shows that recidivism rates for offenders who
received both in-prison and aftercare treatment are lower than those for offenders who received only in-prison substance abuse treatment, which are in turn lower than those for offenders who received no treatment at all.

**Recidivism Rates of Treated vs. Un-treated Offenders**

Figure 5 One and Two Year Recidivism Rates of Treated Offenders Paroled FY 2005/2006
Comparing recidivism rates of all offenders who received both in-prison and community aftercare treatment (shown in Figure 5) to the recidivism rates of all offenders who received no treatment (shown in Figure 6), over the one year and two year observation period, shows that the return to prison rates are significantly reduced for offenders who complete both in-prison and aftercare substance abuse treatment programs (21.9 percent of treated offenders returned to prison at the one year mark compared to 39.9 percent of untreated offenders, and 35.3 percent of treated offenders returned to prison at the two year mark compared to 54.2 percent of untreated offenders). Treated
offenders are less likely to return to prison than non-treated offenders at both the one and two year mark. Therefore, one might conclude treatment is one effective strategy at reducing recidivism among California’s substance abusing offenders. Again, recidivism rates of those in treatment would likely have been higher than the no treatment control group had they not received treatment; therefore, this underestimates the effect of treatment.

This analysis shows treatment is effective in reducing recidivism rates among substance abusing offenders. However, how effective is this treatment? What variables most effectively lower recidivism? How does recidivism differ across demographic groups? There is the expectation that older offenders do not recidivate as quickly as younger offenders as participation in criminal activities expects to decline with age. From offender descriptive statistics, treatment is shown to be very effective for females; therefore, the expectation is that treatment has a much larger effect on reduced return to prison rates for female offenders than for treated male offenders, effects that should be taken into consideration with program implementation and regulation. Race is expected to play a role in recidivism as minorities recidivate at higher rates than Caucasians. However, treatment itself is expected to have the largest effect on recidivism reduction among other alternatives. With treatment, the expectation is that exposure to treatment will decrease the probability of recidivism. In the next chapter, a probit regression explains the effect of age on the probability of recidivism, how much being a female reduces the probability of returning to prison, whether being of a particular race increases
the probability of staying out, and how much the effect of treatment reduces the chances of re-incarceration.
Chapter 4

RESULTS AND COST ANALYSIS

Analysis in the previous chapter shows treatment is a significant factor in reducing recidivism due to repeat substance abuse. Offenders who complete any treatment have a lower probability of returning to prison upon release than offenders who are incarcerated without substance abuse rehabilitative services. Notably, female offenders who receive treatment have the greatest chance of achieving drug free success. Males who complete treatment, albeit slightly less than females, are also much less likely to return to prison due to repeat substance abuse than non-treated male offenders.

Treatment has the largest effect on reducing recidivism due to substance abuse. However, by how much does treatment affect recidivism? Does participation in community aftercare treatment affect the probability of return more than treatment during incarceration? How much do treatment effects differ by gender? Does being of a particular race affect the probability of recidivism? How does commitment offense affect the probability of re-incarceration? A probit regression identifies the impact these variables have on the probability of recidivism. Running a dprobit regression for marginal effects, four variables are determined to be statistically significant, at the one percent level of significance, in determining whether or not an individual recidivates as shown in the regression results model below:
Table 3 Regression Results

Regression Model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.472</td>
<td>.496</td>
<td>.531</td>
</tr>
<tr>
<td></td>
<td>(1.16)</td>
<td>(1.42)</td>
<td>(1.68)</td>
</tr>
<tr>
<td>Age</td>
<td>-.023***</td>
<td>-.019***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.001)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.124***</td>
<td>-.120***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.001)</td>
<td>(.006)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-.124***</td>
<td>-.120***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.001)</td>
<td>(.006)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td>-.012</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(.010)</td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td>.008</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(.113)</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td>.231</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(.369)</td>
</tr>
<tr>
<td>Drug Offense</td>
<td>-.156***</td>
<td>-.147***</td>
<td>-.141***</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.006)</td>
<td>(.007)</td>
</tr>
<tr>
<td>In-prison treatment</td>
<td>-.196***</td>
<td>-.175***</td>
<td>-.169***</td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.004)</td>
<td>(.005)</td>
</tr>
<tr>
<td>Aftercare Treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.2426</td>
<td>0.2692</td>
<td>0.3325</td>
</tr>
</tbody>
</table>

Number of observations=64,728

*** signifies statistical significance at the 1-percent level
(Standard Errors in parentheses)

Three probit regression models were run in predicting the probability of recidivism. Model 1 predicts the probability of recidivism with only two explanatory variables: completion of in-prison treatment and completion of aftercare treatment. This is done to see how treatment predicts impacts the probability of recidivism if the offender
completes in-prison and aftercare treatment. This model, of all the three models, shows the greatest impact of reduced probability for recidivism among substance abusing offenders. Model 2 estimates the probability of recidivism if two more statistically significant variables are added. In-prison treatment and aftercare treatment still stay statistically significant in the model; however, the estimated coefficients decrease slightly. Model 3 estimates the probability of recidivism with all variables used. In this model, only age, gender, completion of an in-prison treatment program, and completion of community aftercare program statistically significantly impact the probability of offender recidivism; race and commitment offense do not. Therefore, being of a particular ethnic group does not increase one’s probability of returning to prison. Commitment offense has no effect on the probability of recidivism.

Interpreting the results: a one-year change in age tells the probability of recidivating. A negative correlation states as an offender gets older, he/she is less likely to recidivate. From the regression, as age increases by one year, the probability of recidivism falls by 2.3 percentage points (Model 2). When more variables are added to the regression, though still a significant variable, the probability falls slightly; as age increases by one year, the probability of recidivism decreases by 1.9 percentage points (Model 3). To see if the treatment effect differs across different age groups of having a higher likelihood of recidivating or not, a cross age comparison found age and the treatment effect to not be statistically significant (F=2.76). Therefore, the treatment effect does not differ across different age groups in its effect on recidivism. Notably however,
there are fewer offenders over age 50 in both groups; older offenders have a smaller probability of recidivism than young offenders, ceterus paribus.

Gender also plays a role in return to prison rates with females much less likely to recidivate compared to their male counterparts, even when comparing non-treated offenders. From the probit model regression results, just being of a female gender, a female offender is 12 percentage points less likely to recidivate than a male offender. This shows females are much less likely to return to incarceration, simply based on their gender. Recidivism rates for female offenders are lower across all categories; therefore, suggesting females are less likely to return to prison than their male counterparts, ceterus paribus.

Considering females lower probability of recidivism based solely on their gender, an F-test is used to test the null hypothesis that females and in-prison treatment have the same slope and the same intercept. The F-statistic proves to be large (1096.24), therefore rejecting the null hypothesis the two regression lines are the same, suggesting providing in-prison substance abuse treatment to females increases the probability of drug-free success with treatment reducing recidivism rates for female offenders. To test if aftercare treatment has the same effect, an F-test is again used to test the null hypothesis that females and aftercare treatment have the same slope and same intercept. The F-statistic proves to be large (1128.36) therefore rejecting the null hypothesis that the two regression lines are the same, suggesting aftercare treatment makes a difference in female offenders reduced recidivism. Since females are much more responsive in not returning to prison after treatment, potential treatment expansion options should be considered in
female institutions and make every effort to encourage female offenders to participate in aftercare treatment upon release for the greatest impact on reduced recidivism.

Variables such as offender gender and age are taken as they are by the institutions, as officials cannot change offender demographic characteristics. Treatment, however, is a viable option which can be provided, and is at the discretion of state officials. Regression results show treatment as having the greatest effect on reducing the probability of recidivism among substance abusing offenders than non-treated offenders. Results indicate if the offender completes an in-prison program the probability of recidivism falls by 16 percentage points (Model 1), by 15 percentage points (Model 2), and 14 percentage points (Model 3). If the offender completes community aftercare treatment the probability of recidivism falls by 20 percentage points (Model 1), 18 percentage points (Model 2), and 17 percentage points (Model 3), all which are significant at the one percent level. Treatment is shown to be more effective at reducing recidivism than either an offender aging out of criminal activities, or from basis of gender. As treatment has the largest effect on a substance-abusing offender’s recidivism, and is a variable that can be utilized to bring about positive change, it is necessary to provide help to substance-abusing individuals through substance abuse treatment rather than solely through corrective action.

How much more effective is community aftercare at reducing recidivism than in-prison treatment only? Completion of an in-prison substance abuse treatment program together with completion of community aftercare treatment, tested using an F-test, is expected to have the largest effect on reducing recidivism rates. The F-statistic is large
(899.41), therefore rejecting the null hypothesis that the two regression lines are the same for in-prison and aftercare treatment; aftercare treatment has the largest effect on the probability of reduced recidivism rates instead of in-prison only treatment.

Again, it is important to remember offenders are not randomly selected, as placement into treatment programs is based on offender severity risk scores. Statistical implications of a non-random sample include sampling bias. Sampling bias undermines external validity; the ability of results found to be generalized to the rest of the population. Problems that occur from sampling bias can lead to an over or under representation of the effect in the population. Given lowered recidivism for these offenders, who are high risk to re-offend to begin with, suggests that treatment has an even greater effect than those indicated by these results; thus, the effect is underestimated. Every effort should be made to engage offenders in community aftercare treatment after completion of in-prison treatment during incarceration for optimal recidivism rates reduction.

**Cost-Effectiveness Analysis**

Research results support the clinical effectiveness of treatment on reducing re-incarceration with reduced post-release recidivism rates. However, the costs associated with providing treatment must also be examined to determine if treatment is cost-effective as well as clinically effective. Taking only costs into account, thereby making no attempt to estimate the monetary value of the program effects, a cost-effectiveness analysis is used to determine if treatment is a sound economic investment in reducing
recidivism. Cost savings come from the offender not recidivating. This analysis analyzes the costs and estimates the cost-savings of offenders who completed in-prison and community aftercare treatment and did not recidivate, offenders who completed in-prison treatment only and did not recidivate, and offenders who were incarcerated without treatment and did not recidivate.

This cost analysis focuses primarily on the costs of housing offenders in prison, and the cost savings generated when the offender does not return to prison. While other legitimate costs such as costs to society are recognizable, the focus of this study intentionally limits the cost-effectiveness analysis solely to the criminal justice systems perspective where cost estimates are comparatively more direct and defensible (Griffith et al., 1999). Estimated costs for incarceration, in-prison treatment, and community aftercare are obtained from the California Legislative Analyst’s Office (Simbol et al., 2011). These cost estimates reflect the cost of housing inmates only. They do not include expenditures associated with inmate health care, facility operations and maintenance, administrative costs, or inmate support costs. Simple housing security costs total $54 per day per inmate for the average California prison, $69 per day per inmate in in-prison treatment, and $80 per day per offender in community aftercare treatment.

Annual cost for a prison term and/or for treatment is the total number of days (365) multiplied by the cost per day multiplied by the number of offenders incarcerated and/or in treatment. An important assumption made in cost calculation is when an offender recidivates, they are in prison for, on average, one year. This assumption holds true for those who recidivate in two years as well as returns for parole violations are, on
average, one-year re-incarceration time. Inmate security housing costs total $19,710 per inmate per year. For the 32,318 incarcerated non-treated inmates, annual cost of housing equaled $636,987,780. Offender in-prison treatment approximates $15 dollars per day per inmate, not including cost of housing. An inmate is entered into treatment six months prior to their projected release date for a total of 180 days of treatment. On a per inmate basis, the cost of in-prison treatment is $15*180 days, which totals $2700. For the 21,464 inmates receiving in-prison treatment, the six-month in-prison treatment cost equals $57,952,800. The six-month cost of housing prior to treatment equals $208,630,080. The annual cost of the six-month cost of housing plus the six-month in-prison treatment totals $475,212,960. Therefore, the annual cost of providing in-prison treatment is $52,157,520.

Community aftercare treatment costs $80 dollars per day per parolee. A parolee enters treatment upon release for a total of 90 days of aftercare treatment. On a per parolee basis, the cost of aftercare treatment is $80*90 days, which totals $7200. For the 10,946 parolees receiving aftercare treatment, total community aftercare cost equals $78,811,200. Adding in the annual cost of housing and in-prison treatment the annual cost of housing, in-prison treatment and aftercare treatment equals $321,155,640. The annual cost of providing aftercare treatment is $105,409,980.

Cost savings come from reduced offender recidivism. With in-prison treatment, the probability of recidivating is reduced by, on average, 15 percent. Expected cost savings equal the probability of recidivating (.15) multiplied by the annual per inmate cost ($19,710) for an expected savings of 2956.50 dollars. The net benefit for an in-prison treated inmate equals 256.50 dollars. If an offender chooses to go onto aftercare
treatment, there is an additional expected savings from a further reduction in the probability of recidivating by, on average, 18 percent. The expected cost savings then equal the probability of recidivating (.18) multiplied by the annual per inmate cost ($19,710) for an expected savings of 3547.80 dollars. On a per inmate basis, aftercare treatment is not cost-effective. Even though costs exceed savings from reduced recidivism, as it accounts for only cost savings, it does not capture all aftercare benefits, as it does not take into account societal benefits from crime reduction.

Substance abusing offenders who complete in-prison and aftercare treatment probability of recidivism is 18 percent lower than non-treated substance abusing offenders. An 18 percent reduction in probability of recidivism translates to 1,970 fewer offenders returning to prison, with an annual cost savings of $38,828,700. Substance abusing offenders who complete in-prison treatment probability of recidivism is 15 percent lower than non-treated substance abusing offenders. A 15 percent reduction in the probability of recidivism translates into 3,220 fewer offenders returning to prison, with an annual cost savings of $63,466,200.

If cost savings is the goal, it is advisable to provide in-prison treatment only as cost savings are only for those in in-prison treatment, not aftercare. However, if the main goal is reduced recidivism rates, it is worthwhile to provide both in-prison treatment and community aftercare to substance abusing offenders. While cost savings from reduced recidivism do not exceed treatment costs, the provision of in-prison treatment and community aftercare is advisable for optimal reduction in recidivism when compared to the costs of incarceration without treatment.
Chapter 5

CONCLUSION

Substance abuse treatment works in reducing recidivism. Following offenders who completed both in-prison and community aftercare substance abuse treatment, offenders who completed in-prison treatment only, and offenders who were eligible for but received no treatment over a one year and two year observation period, recidivism rates are lower across all categories. When compared to offenders who received no treatment and keeping in mind these offenders are at higher risk to recidivate already, the effect of in-prison treatment is underestimated due to sampling bias.

Lower recidivism rates garner higher cost savings to the state, as cost savings are generated from an offender not recidivating. The probability of recidivism among offenders who completed in-prison and aftercare treatment was 18 percent lower than non-treated offenders. An 18 percent reduction in the probability of recidivism among the 10,946 parolees receiving community aftercare treatment translates into 1,970 fewer inmates returning to prison. The probability of recidivism among offenders who completed in-prison treatment only was 15 percent lower than non-treated offenders. A 15 percent reduction in the probability of recidivism among the 21,464 inmates receiving in-prison treatment translates into 3,220 fewer inmates returning to prison. Of the total 32,410 offenders exposed to treatment, 5,190 do not recidivate, translating into an annual cost savings of 102 million dollars.
Several studies have been done to determine the effectiveness of providing substance abuse treatment to substance abusing offenders in other states. This research provides quantitative evidence that substance abuse treatment reduces recidivism in California among those eligible. The importance of providing substance abuse treatment is demonstrated through reduced recidivism rates, as treatment is shown to be beneficial in reducing the return to prison rate among substance abusing offenders in California. Implications of these findings support the provision of a continuum of services that extend from the institution to the community for the most effective way to reduce recidivism. In-prison treatment is more effective in reducing recidivism than no treatment at all; however, the greatest treatment effect is seen when the offender follows through on both programs.

Analyzing recidivism by gender showed male offenders who completed in-prison treatment only had a slightly higher recidivism rate than non-treated male offenders. This result goes against the expectation that non-treated offenders have lower recidivism rates than treated offenders. Perhaps male offenders need the whole continuum of treatment for the treatment to be effective, or perhaps this occurs from the possibility of sampling bias, as offenders are not randomly assigned to substance abuse treatment; treatment is assigned by the offender’s risk level rather than by random selection. Therefore, it is important to keep in mind that any expansion of treatment is not expected to have the same success rate. As treatment is assigned based on the severity level of the offender’s risk level, those who are chosen for treatment participation are initially believed to be more likely to benefit from treatment. If the program is to be expanded, expansion comes
from inmates already deemed less likely to recidivate from the outset; therefore, expansion should not be expected to achieve the same success rate. Due to this non-randomization of the data, result findings may contain sampling bias.

Possible future research from this analysis is to find a group of inmates that were sent to substance abuse treatment but dropped out, and observe the recidivism rates for those inmates to see what their return to prison rates are. This is an interesting avenue to explore, as these are the same group of inmates with the same risk factors with perhaps a less biased estimate of the treatment effect. Another topic of further analysis is to continue the research over a longer period of time than just a one year and two year observation period. The follow-up period examined in this analysis is a short-term examination of the effectiveness and cost-effectiveness of substance abuse treatment on recidivism; of further interest is to examine whether these benefits extend over the long term.


